

How Blockchain Technology can provide Opportunities for Municipalities

CAGFO – October 2019



Presented by: Brian Beveridge, CMC, Partner

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Topics



What blockchain is and how it works at a very high level

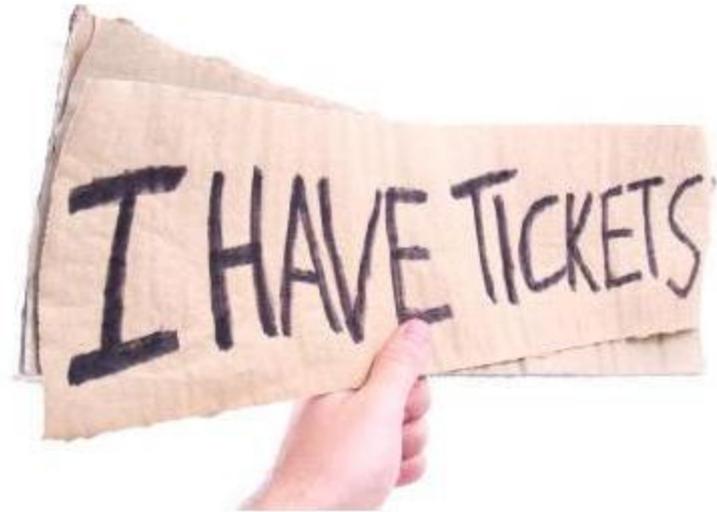


Where can Municipalities and other Government organizations find Opportunities



How to explore and get started adopting this technology







What is StubHub's FanProtect Guarantee?

When you buy tickets on StubHub, we guarantee:

- You'll get the tickets you ordered in time for the event and they'll be valid for entry
- If that doesn't happen, we'll locate comparable replacement tickets or send you a refund
- You'll get a refund if your event is cancelled and not rescheduled
- We handle all customer support issues, so sellers will never contact you directly
- [Read the full buyer policy](#)

When you sell tickets on StubHub, we guarantee:

- It's free to list your tickets
- You set your price and can adjust it at any time before your tickets sell
- You'll get paid for all sales you complete as promised in your listing
- [Read the full seller policy](#)

What Problems could be solved by Blockchain?



No trust between parties



Validation of Ticket – no Double Spend



Middleman Fees

What is Blockchain?

Media Topic of the Day

Financial News

Blockchain has come to Bay Street, but will Bay Street get on board?

Corporate Canada's adoption of the technology that is expected to have a huge impact on the financial world has been mixed

Financial News

Blockchain is going to have a huge impact on the future of banking

Media Topic of the Day

Financial News

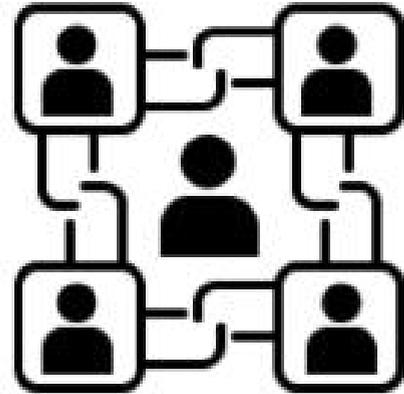
While Masrani said TD had not yet deployed blockchain in any of its businesses, Bay Street may also have no choice but to get with the times, and fast. Campbell Harvey, a professor of finance at Duke University, told a conference at the University of Toronto's Rotman School of Management in March that more than half of the class of 2018 would have training in blockchain.

“You need to take this disruption very seriously, even though there’s a lot of hype,” Harvey said.

Source: Financial Post

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Blockchain Significance



- **60% believe blockchain will prove to be the most significant technology development to affect business since the Internet**

Source: The Future of Retail Financial Services - by Cognizant, Marketforce and Pegasystems

My Personal Opinion



- **Blockchain will fundamentally revolutionize the architecture of the internet**
- **As a result, it will fundamentally revolutionize business architectures**

Blockchain Market Overview

- **24+ countries currently investing in DLT (distributed ledger technology)**
- **80% of banks predicted to initiate DLT projects by 2017**
- **Over \$1.4 billion USD in investment over the past three years**
- **90+ central banks engaged in DLT discussions worldwide**
- **90+ corporations have joined blockchain consortia**
- **2500+ patents filed over the last three years**

Source: Cognizant 2016



What is blockchain?

“ A record keeping system (ledger) – of Any Asset to record the transactions of importance, that is *electronic* and *distributed*” – Hence the moniker – DLT – Distributed Ledger Technology.

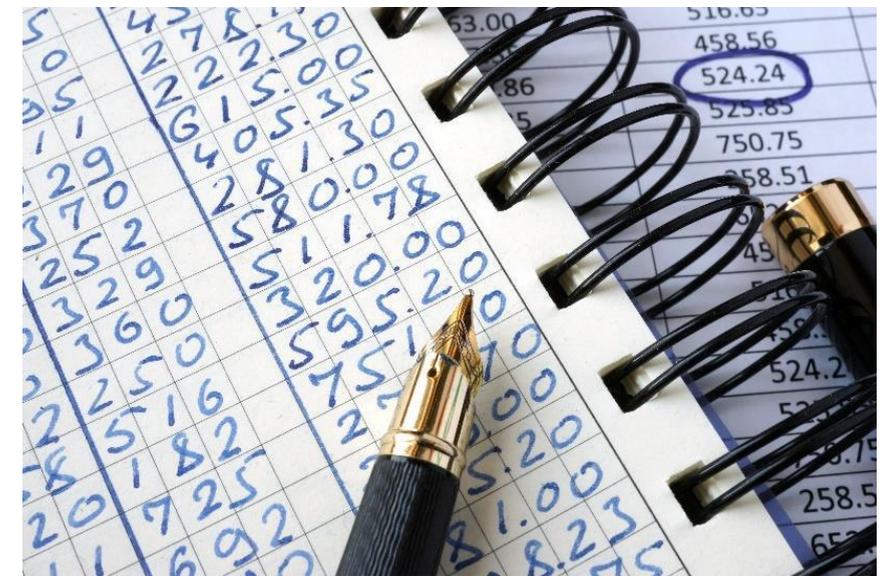
Some examples include:

- Land/Property title Registry
- Transfer of ownership
- Certificates, bond, loyalty points etc..

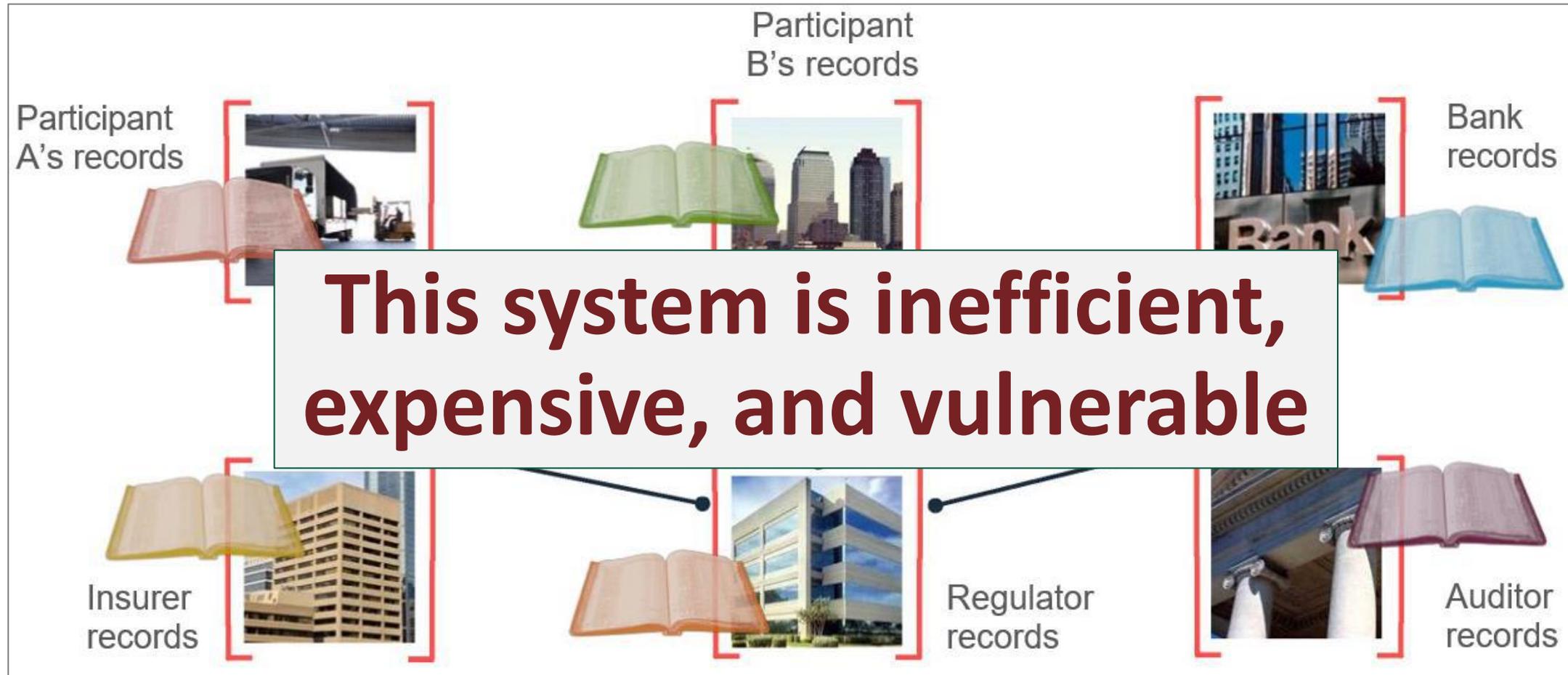
Ledgers are Key

Ledger is the system of record for a business.

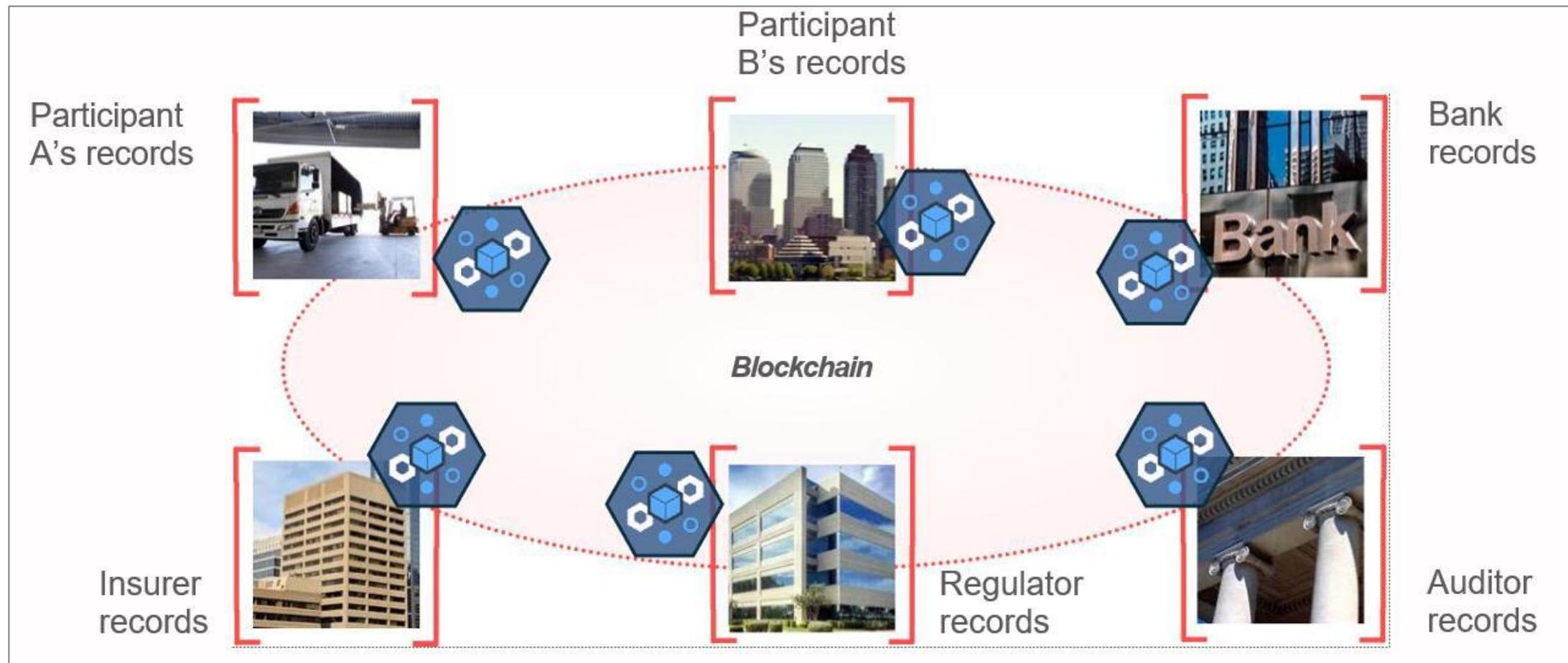
- Business will have multiple ledgers for multiple business networks in which they participate.
- **Transaction**—an asset transfer onto or off the ledger
 - John gives a car to Anthony (simple)
- **Contract**—conditions applicable for transaction to occur
 - If Anthony pays John money, then car passes from John to Anthony (simple)
 - If car won't start, funds do not pass to John (as decided by third party arbitrator) (more complex)

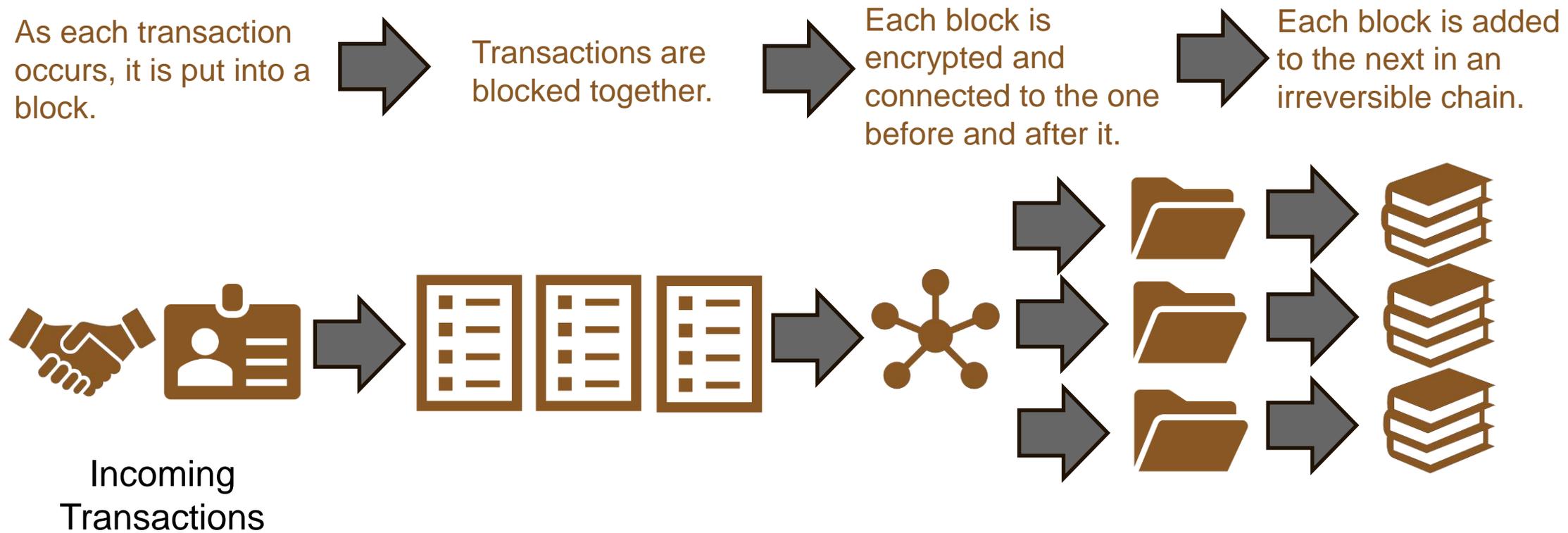


The Problem



The Solution—Blockchain





Blockchain: A Distributed Ledger (DLT)

Benefits: Increased transparency, better scalability, security, and innovation

What is Blockchain?

In business terms, blockchain allows:

Untrusted parties,

to reach consensus,

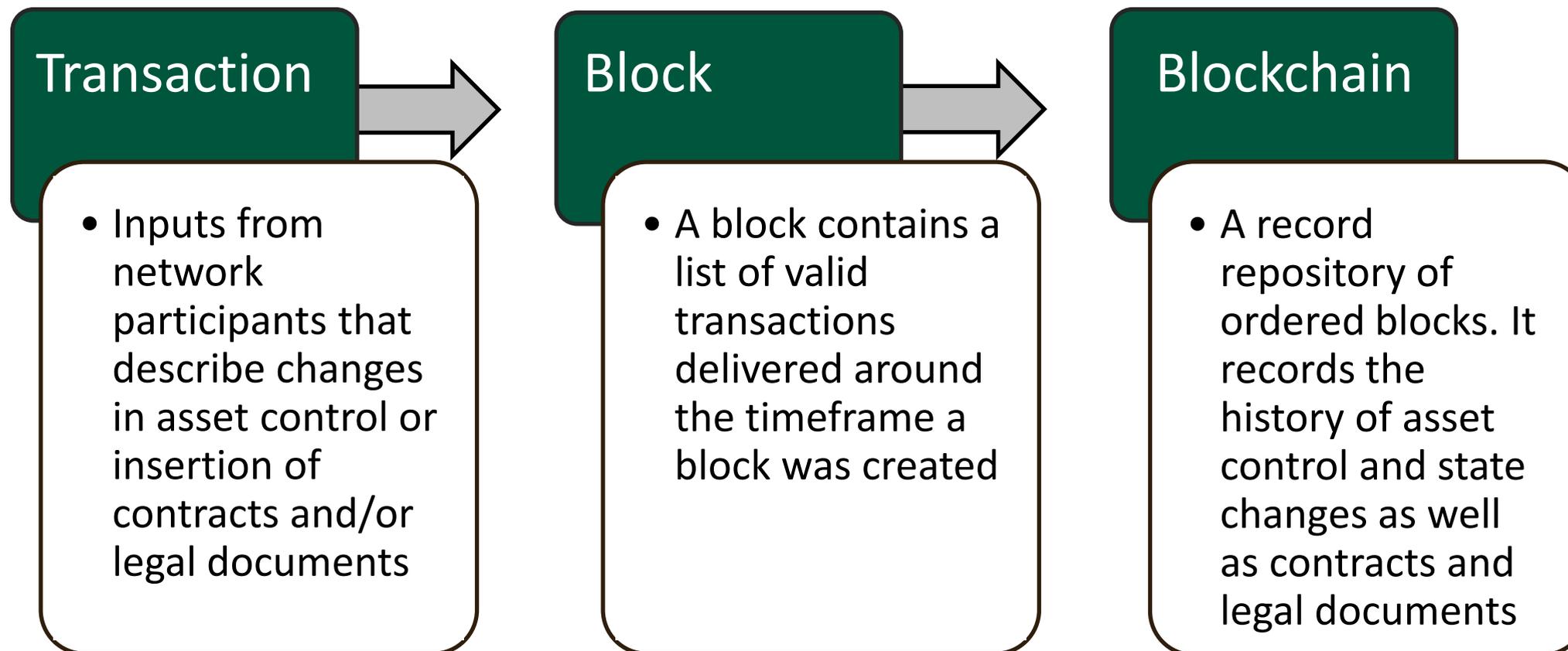
on a shared digital library,

without intermediaries

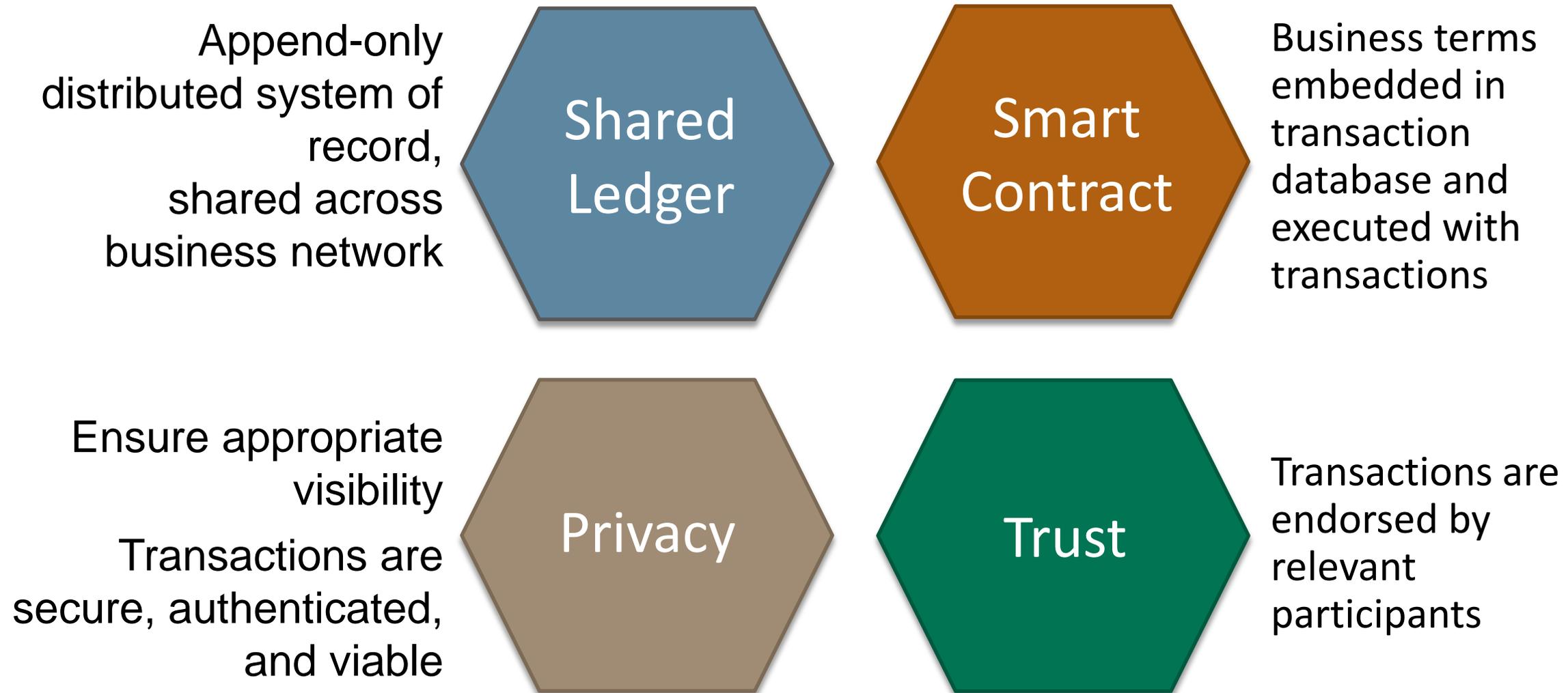
That's it ... but it's a lot!

Blockchain = Secure and Trusted Record Keeping

- **By design, no one party can modify, delete, or even append any record to the ledger without consensus, ensuring the immutability of transactions, contract, and other legal documents**



Requirements of Blockchain for Business

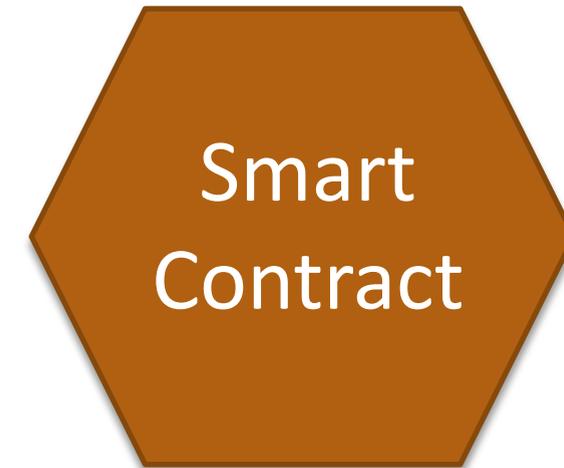


Source: IBM

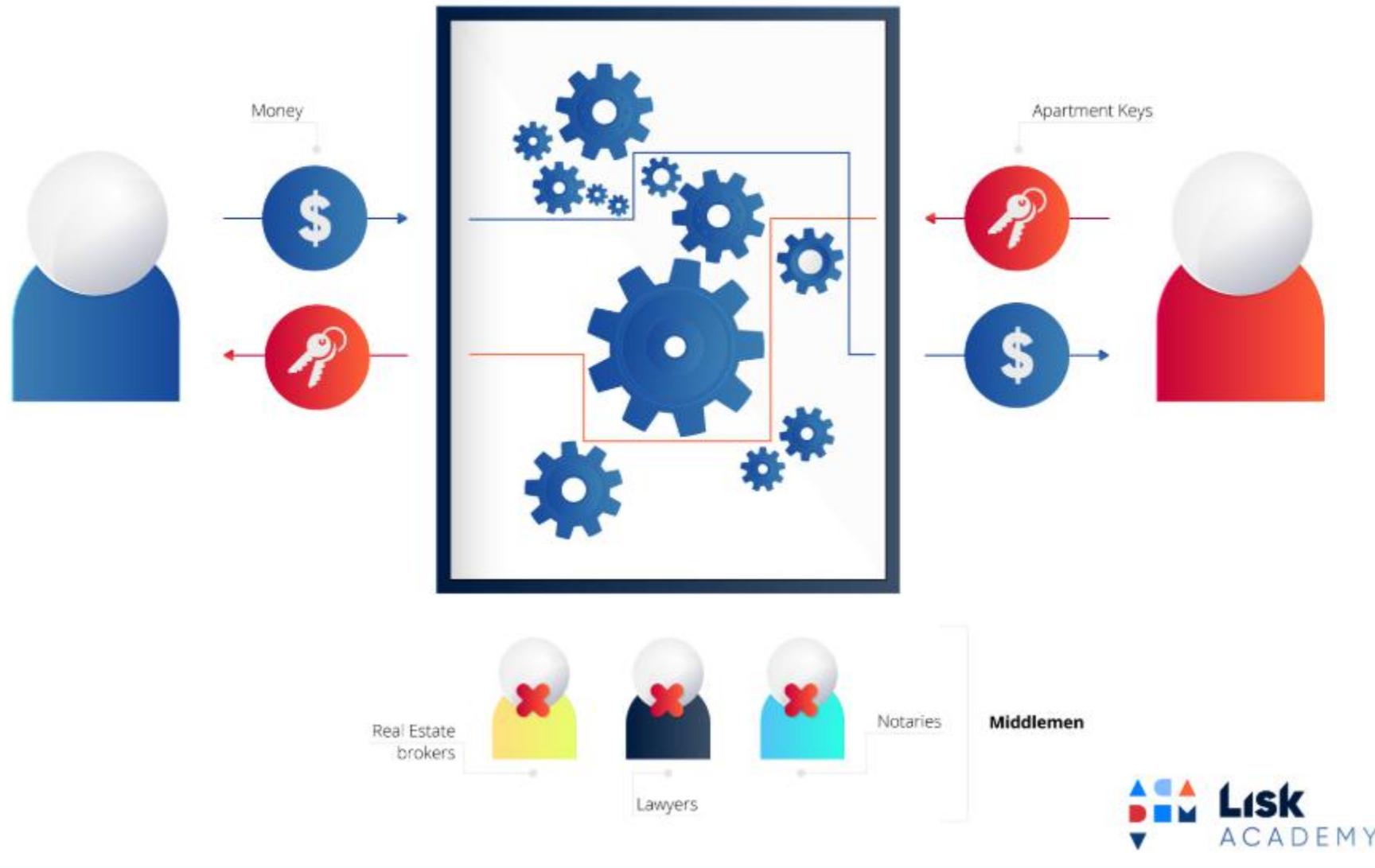
Smart Contract

Business rules implied by the contract ... embedded in the blockchain and executed with the transaction

- **Verifiable, signed**
- **Encoded in programming language**



Smart Contracts in Apartment Rentals



Smart
Contract

Smart Contract



```
1 contract MetaCoin {
2   mapping (address => uint) balances;
3
4   function MetaCoin() {
5     balances[tx.origin] = 10000;
6   }
7
8   function sendCoin(address receiver, uint amount) returns(bool sufficient) {
9     if (balances[msg.sender] < amount) return false;
10    balances[msg.sender] -= amount;
11    balances[receiver] += amount;
12    return true;
13  }
14
15  function getBalance(address addr) returns(uint) {
16    return balances[addr];
17  }
18 }
19
```



Benefits of Blockchain



Saves time

Transaction time from days to near instantaneous



Removes cost

Overheads and cost intermediaries



Reduces risk

Tampering, fraud & cyber crime



Increases trust

Through shared processes and recordkeeping

Source: IBM

What benefits does Blockchain bring to Municipalities?

- **Transparency**
- **Efficiency**
- **Risk Mitigation**
- **Empowering the Community**

Use Cases

Where can Municipalities and other Government organizations find Opportunities?

This is a great resource for CAGFO...

BLOCKCHAIN TECHNOLOGY:
LOCAL GOVERNMENT APPLICATIONS AND CHALLENGES

An International City/County Management Association (ICMA) and
Government Finance Officers Association (GFOA)
White Paper

ICMA



Identity Management

- Digital identity is both a use case for blockchain and the enabler that allows each of the other assets discussed for blockchain integration to exist. Whether cryptocurrencies or cars, each asset needs to be rendered digitally to be transacted on a blockchain, and the owner or transactor also needs a digital identity to engage in those transactions. The magnitude of this challenge is recognized by public sector actors around the world—a world in which one-fifth of the world's population lives without a legal or officially recognized identity.

Existing pain points:

- Lack of standards for establishing digital identity
- Differing attestation processes and identity “entry points” prevent economic engagement and can hinder public sector service provision

Blockchain value proposition:

- A secure, self-sovereign identity could enable efficient transactions across a wide variety of asset classes
- Individual and explicit control over which identity elements are shared for which purposes

Land Registration

- Deeds and titling not only provide critical protection for homebuyers in developed nations—they serve as a basis for investment and economic growth across many developing nations. By securing a unique and non-corruptible record on a blockchain and validating changes to the status of that record across owners, a reliable property record can be created, whether for a piece of land that heretofore had no owner or as a link between stovepiped systems.

Existing pain points:

- License and registry processes are paper-based and fragmented, making transactions costly, inefficient, and vulnerable to tampering
- In the United States, landowners spent \$800 million in 2014 and '15 on title insurance to cover risks associated with real estate titles¹⁷

Blockchain value proposition:

- A decentralized, standardized system for land registration records could reduce the number of intermediaries required, increase trust in identity of transacting parties, increase process efficiencies, and decrease time and cost to process
- Recording property rights via blockchain would enable \$2–4 billion in annual cost savings in the United States alone for title insurers through a tamper-proof ledger¹⁸

Voting

- **This critical and legitimacy-granting public function has been the source of much activity among those working with blockchain. Citizens can cast votes the same way they initiate other secure transactions and validate that their votes were cast—or even verify the election results. Potential solutions are currently working to blend secure digital identity management, anonymous vote-casting, individualized ballot processes (for example, a vote “token”), and ballot casting confirmation verifiable by (and only by) the voter.**

Existing pain points:

- **High costs related to ballot printing, electronic voting machines, maintenance, etc.**
- **Increasing threats of cyberattacks compromising election results**
- **Lack of transparency due to a centralized process of election results audit**
- **Voting delays or inefficiencies related to remote/absentee voting**

Blockchain value proposition:

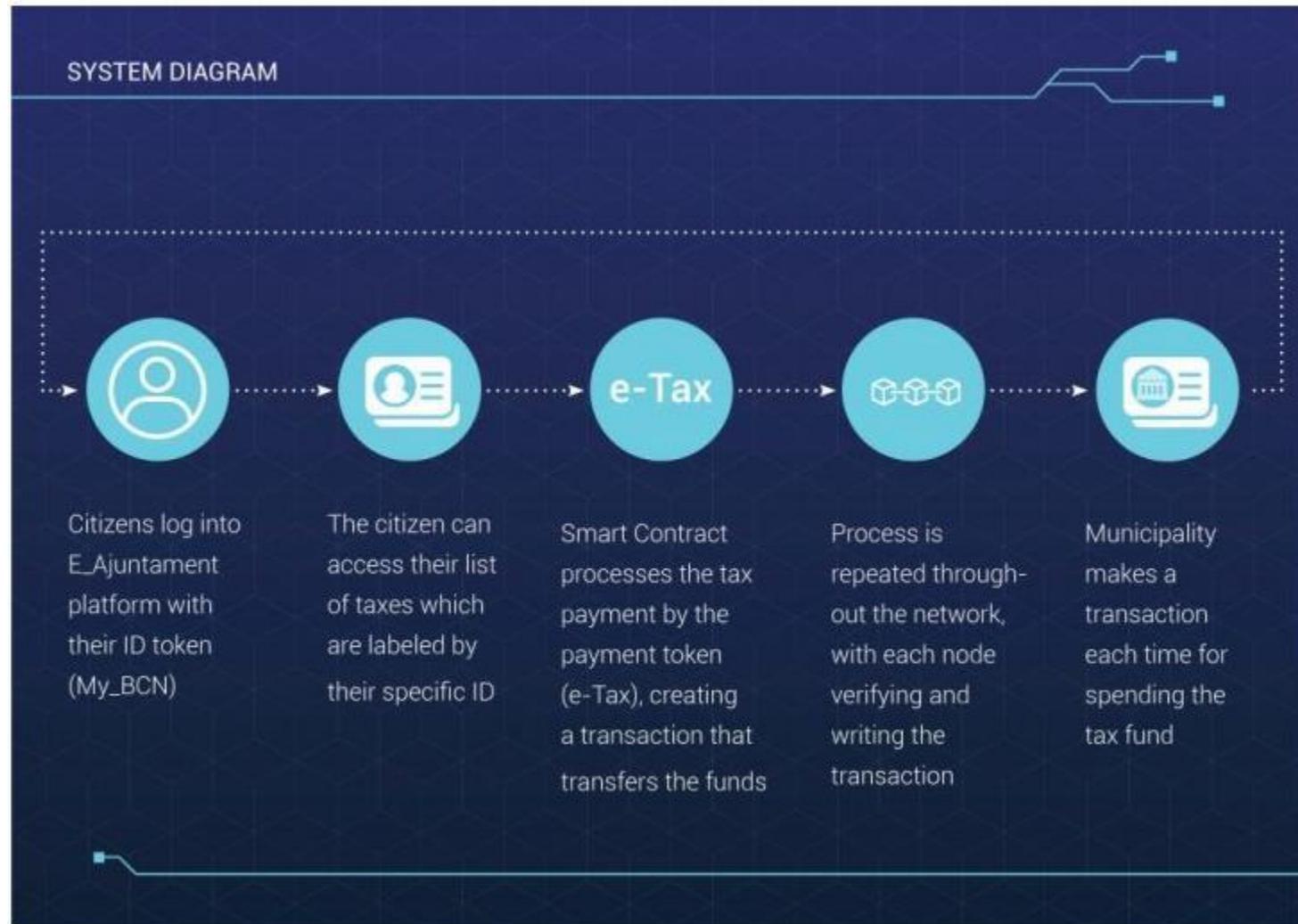
- **Potential cost savings through blockchain-enabled voting**
- **Potential for enhanced security and audibility of votes**
- **Potential for greater participation in elections, including remotely**
- **Greater transparency meeting citizens' needs**

Municipal Taxes – Catalonia Example

- **Disintermediation Strategies by enabling Transactions using Blockchain**
- **This system removes 4 “middle men” :**
 - City notary (for registering the assets and goods of the citizens because now they are automatically stored in blockchain.
 - Tax officer of city council , transactions are operated based on the latest update for the smart contracts (example, if a neighbourhoods land value has increased, this change is also embedded in the smart contracts code , and the new tax amount will automatically change)
 - External audits (for other types of goods registration, such as vehicles and pets , etc,)
 - Banks, where citizens will no longer need to go through to pay their tax.
- **How does the project empower citizens?**
 - Policies can not be corrupted regarding ownership.
 - Transparency regarding municipality expenses will be granted to the citizens.

Municipal Taxes

- **Catelonia Example:**



Residents in some Canadian municipalities can pay property taxes with Bitcoin



FILE- In this Dec. 8, 2017, file photo, coins are displayed next to a Bitcoin ATM in Hong Kong (AP Photo/Kin Cheung, File)



Tara Deschamps, The Canadian Press

Published Tuesday, September 17, 2019 1:06PM EDT

Residents in a handful of Canadian municipalities have a new, if risky, payment option for property taxes.

The cities of Richmond Hill and Innisfil, both north of Toronto, have become the first in the country to accept cryptocurrency -- a digital-based payment system operating without the central oversight of banks or credit card companies -- for property tax payments. Other cities, including Toronto, have explored the option, but have yet to implement it.

Risks and Challenges

Risks and Challenges of Blockchain in Public Sector

- **Trust and Cybersecurity**
- **Privacy Concerns**
- **Access to Technology by Citizens**
- **Changing Minds and Laws**
- **Slow and Expensive Implementation**

Blockchain Myths

Blockchain Myths

- **Blockchain is Bitcoin**
 - Bitcoin is just one cryptocurrency application of blockchain
- **Blockchain is better than traditional databases**
 - Blockchain's advantages come with significant technical trade-offs that mean traditional databases often still perform better
- **Blockchain is immutable or tamper-proof**
 - Blockchain could be tampered with if >50% of the network computing power is controlled

Blockchain Myths

- **Blockchain is 100% secure**
 - Overall blockchain system security depends on the adjacent applications – which can be attacked or breached
- **Blockchain is a “truth machine”**
 - Blockchain cannot assess whether an external input is accurate or “truthful” – this applies to all off-chain assets and data digitally represented on blockchain

And the point is?

Blockchain solves many problems and creates new opportunities.

Where do you think blockchain could fit into your organization (if at all)?

**How can your
organization get started
with blockchain?**



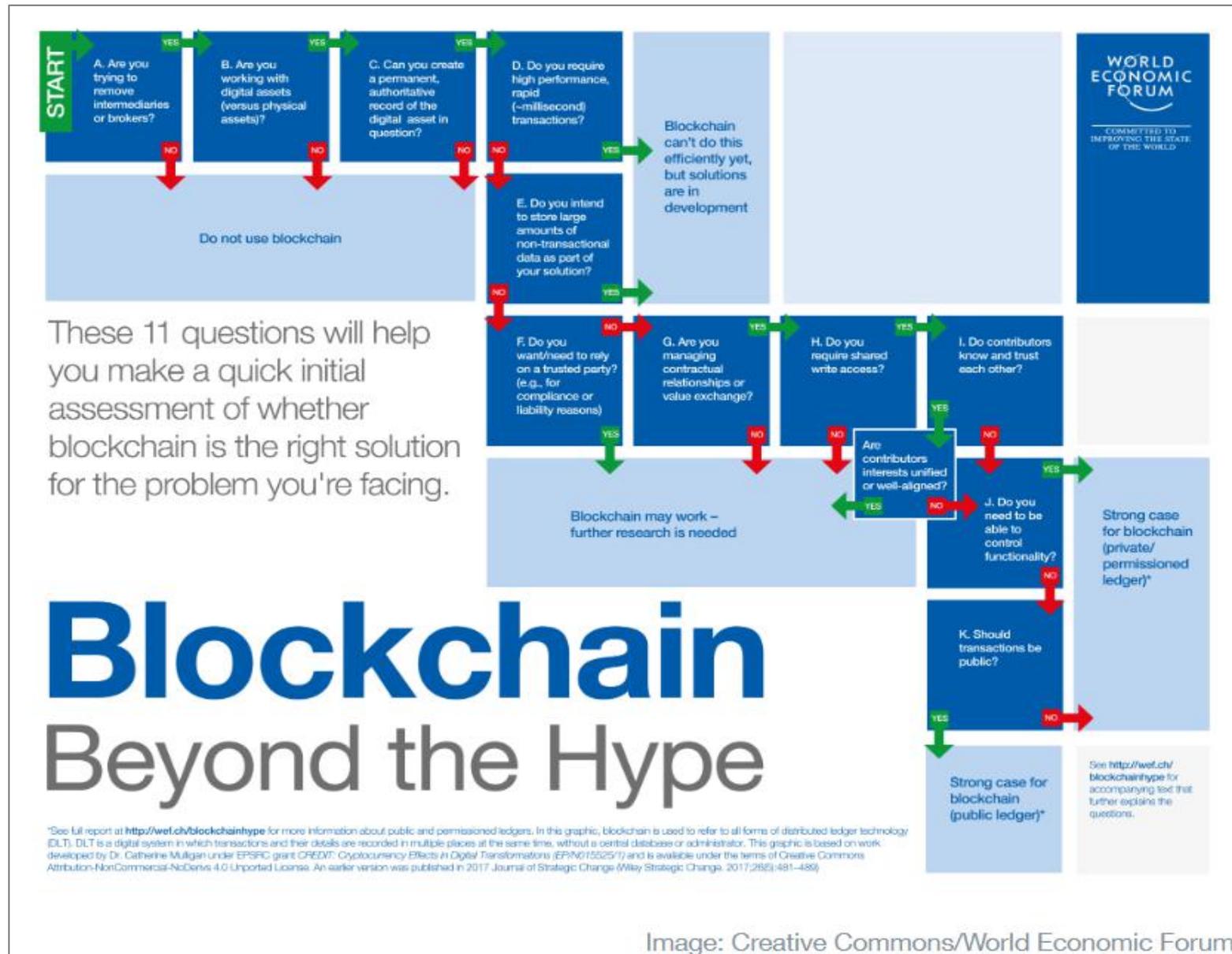
Executive Discovery



Blockchain Discovery Session (1-2 hour workshop or Discovery Days)

- **Discuss your industry and your business model**
- **How Blockchain could impact your organization and/or your industry**
- **Is blockchain a fit for your organization**
- **Brainstorm potential use cases**
- **Determine next steps**

Is blockchain a fit?



Experiment



Proof of Concept

1

A proof of concept is a theoretical demonstration to confirm that certain concepts or processes are feasible for real-world application. Its purpose is to validate functional assumptions, to validate technical feasibility, to identify potential blocking points, to determine the customization efforts or to detect potential performance issues.

2

Prototype

A prototype is an early version, with a limited number of characteristics, built to validate a concept or process. The purpose of a prototype is to trial the proof-of-concept and to provide subsequent specifications for a real, working system rather than a theoretical one.

3

Pilot

A pilot is the first production version of a concept or process. The purpose of a pilot is to test if a concept or process are working as expected in a real, working system.

First Project(s)



- **All phases of launching a blockchain project:**
 - Planning (scope, architecture, etc.)
 - Designing
 - Building
 - Testing
 - Deploying
- **Work with an experienced partner who can deliver all phases and develop skills within your own team**

Blockchain at Scale



- **Time to take off the training wheels:**
 - Expanding your business network
 - Scaling for production volumes
 - Integration with enterprise applications (payments, ERP, portals, etc.)
 - Enabling your team to sustain

Summary

- **Blockchain technology allows untrusted parties to reach consensus on a common digital history without intermediaries—a big deal**
- **The technology provides more security measures through transaction verification, inability to delete transactions, and the difficulty of hacking thousands of computers at once**
- **Many opportunities to leverage Blockchain within Government organizations**
- **It's still early days – take the time to do your homework before jumping in**



MNP

THANK YOU

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